

CONVENTION OF THE MAGNETIC POLES IN MEDICINAL BIOMAGNETISM

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ABSTRATC

The Medicinal Biomagnetism (MB) technique, developed in 1988 by Isaac Goiz Durán, has particular conventions for establishing the nomenclatures of the magnetic poles of therapeutic magnets, which diverge from the current convention of classical physics. **Objective:** To propose a convention and standardization of the magnetic poles used in the MB technique. **Method:** Narrative and exploratory literature review on the physical and historical principles that underlie the MB theory on the magnetic poles of therapeutic magnets and the biomagnetic poles of Biomagnetic Pairs (BMP). In addition to articles obtained from SciELO, Google Scholar, and Lilacs, the research used book chapters and texts on MB available online and in libraries. **Results:** The divergence of nomenclatures, reflects negatively on the teaching and practice of MB among schools that perpetuate the method. **Conclusion:** We propose the

use of the convention established by Isaac Goiz Durán, creator of the technique, where it is defined that the north pole of the MB magnet is the one that points to the geographic south and the south pole of the MB is the one that points to the geographic north, contrary to the convention of classical physics. In the MB, the north pole MB of the magnet is called negative and the south pole MB is called positive. The north pole MB of the magnet is applied to the accumulation of negative charges (north pole of the BMP), while the south pole MB of the magnet, to the accumulation of positive charges (south pole of the BMP). Therefore, we suggest this convention for standardization in future academic research and clinical practice.

Keywords: Medicinal Biomagnetism; Biomagnetic Pair; Static Magnetic Fields; Magnetic Therapy; Pole Convention; magnets; Magnetic Pole; South Pole; North Pole.

1. INTRODUCTION

Since ancient times, the knowledge that has become established and constituted itself as science has come from a careful and patient observation of the phenomenon of nature. It took decades, even centuries, for concepts that were considered alluded to to be scientifically proven. Magnetism is a phenomenon that was observed, but poorly understood for a long time, and that today is a subject of interest in physics, biology, and even medicine. Throughout history its applicability has been investigated for many different purposes (CARBONELL et al., 2017; KRUEGER BECK et al., 2011).

From the studies of magnetism, the interdisciplinary study area of biomagnetism arises, this which is a science that studies the magnetic fields that are generated in living beings, from microorganisms to mammals, that is, the biomagnetic fields generated by these beings (ARAÚJO; CARNEIRO; BAFFA, 2004; DURAN, 2011; MARTÍNEZ, 2018; YOUNG; FREEDMAN, 2015). The term Biomagnetism can also be understood as a therapeutic practice, considering that it is part of the nomenclature of a therapy that uses magnetic fields (magnetic therapy) called Medicinal Biomagnetism (MB). This therapy, the MB, is

classified as a theory within this great science, and was developed by the Mexican physiotherapist, physician and acupuncturist, Isaac Goiz Durán. The term “Medicinal Biomagnetism”, a name updated in December 2020 in a course given by the creator of the technique himself (BOSSA, 2021a), refers to the therapy developed in 1988, based on the knowledge of Richard Broeringmeyer, a physician at the American Space Agency (BROERINGMEYER, 1991; GOIZ DURÁN, 2008).

MB is understood as a complementary and integrative medicine, according to the classification of the Pan American Health Organization (PAHO, 2022), however, in Brazil, it is not yet recognized by the National Policy of Integrative and Complementary Practices (PNPICs) (BRASIL, 2015).

The MB technique consists in the identification/diagnosis and treatment of Biomagnetic Pairs (BMP), a concept defined as

[...] the set of charges that identify a pathology and that is formed by two main charges of opposite polarity, which are formed at the expense of the fundamental alteration of the pH of the organs that support it. From this bioenergetic duality follows another fundamental principle that I call Normal Energetic Level (NEN). (GOIZ DURÁN, 2008, p. 83, own translation).

These pairs are identified through a biomagnetic or bioenergetic scanning (BROERINGMEYER, 1991; FRANK, 2017; MARTÍNEZ, 2018) where it identifies the changes of indirect qualitative disorder of pH. “The scanning is based on a variation of applied kinesiology or muscle testing, a practice very common among chiropractors, naturopaths, and some integrative medical doctors (FRANK, 2017, p. 309).” This phenomenon in the MB technique is called the Magnet-sympathetic-foot reflex (DE CASTEJÓN, 2015). Upon detecting this

imbalance of magneto/electrical forces of dysfunctional biochemical elements, treatment is performed by impacting Static Magnetic Fields (SMF) generated by medium intensity magnets (from 1,000 to 7,500 Gauss) to depolarize dysfunctional magnetic fields present at specific points in the body (BOSSA, 2021b).

Considering that this technique has particular conventions to establish the nomenclatures of the magnetic poles of the therapeutic magnets, which diverge from the current convention of classical physics, the proposal of a convention and standardization of the magnetic poles used in the MB technique becomes relevant, contributing to the standardization of future academic research and clinical practice.

2. METODOLOGIA

For this bibliographic research, narrative, qualitative, and exploratory methods were used. These methods provide a current view about the theme, broadening the understanding of the phenomenon and although it is subject to biases (FREITAS, 2017), it was used due to the need of explaining the theme, presenting perspectives, as well as an evaluation of the quality of the materials used in this review.

The Scientific Electronic Library Online (SciELO), LILACS, Google Scholar, book chapters and texts on the MB available online and in libraries were consulted, considering the period from 1988 to 2022. The choice of these databases was due to their accessibility and scientific criticality, and the search period involved the beginning of the development of the technique, although the more recent sources were given preference. The descriptors used were: “biomagnetismo”; “par biomagnético”; “campos magnéticos estáticos”; “biomagnetismo medicinal”; “terapia magnética”; “pólos magnéticos”; “ímãs”; “convenção de pólos magnéticos” in conjunction with the Boolean operator “AND”. For greater comprehensiveness, materials were searched using the descriptors in English: “biomagnetism”; “biomagnetic pair”; “static magnetic fields”; “medicinal

biomagnetism”; “magnetic therapy”; “magnetic poles”; “magnets”; “magnetic pole convention”.

We included full articles on the subject in Portuguese, English and Spanish, prioritizing those with DOI – Digital Object Identifier. Priority was given to the search of publications that addressed the theme of study and answered the main question by relevance: materials involving the MB technique or convention developed by Isaac Goiz Durán; and physical and historical principles that underlie the MB theory on the magnetic poles of therapeutic magnets and biomagnetic poles of BMP.

Given the scarcity of scientific articles on MB theme, notes from books and texts available in libraries, as well as monographs and theses, were considered and included. On the other hand, the knowledge that is well defined and robust in the literature, such as the physical fundamentals, was preferably found in relevant books in the area. Journals that did not present content related to the studied theme or that did not add to the theme were excluded, such as: repeated content involving other techniques like magnetotherapy; therapy by electromagnetic stimulation; radiological exams; electronic equipment; relationship between magnetism and agronomy; business plan for complementary medicine clinics/hospitals; other complementary and integrative therapies; among others in which their content did not apply to the theme.

3. RESULTS AND DISCUSSION

The largest range of materials found is concentrated on Google Scholar platform, with the following descriptors in English: “biomagnetism”; “static magnetic fields”; “magnetic therapy”; “magnetic poles”; “magnets”; “magnetic pole convention”. The results obtained in the search for articles on MB were scarce, which implies the need for further research and publications on this subject. After criteria, materials were selected according to their nature, pertinence, and coherence with the objective of this work.

We selected books edited by universities in Ecuador and Mexico, authored by Isaac Goiz Durán, and other European doctors who studied his theory, such as Salvador Gutiérrez and Enrique de Juan González de Castejón. Also were used books that served as a basis for the MB, such as those written by Albert Roy Davis, Walter C. Rawls, and Richard Broeringmeyer. To substantiate the physical and historical principles of the use of magnetic poles, nine books from the field of physics were selected. As for the bases of Traditional Chinese Medicine (TCM), three books were used. And for magnetic therapy, one book (PHILPOTT; KALITA; LOTHROP, 2000). When addressing the technique and method of using the magnetic poles for MB, according to Isaac Goiz Durán's method, one BMP guide was presented, two articles, two monographs, and three specialization theses that demonstrated this application. Also a critical article was included, about the technique, an article with future perspectives about oMB research branch, and other material about infographics as a didactic resource for MB training.

According to the research, the results point to divergences in nomenclatures regarding the classification of the magnetic poles of the therapeutic magnets used in the MB technique and in classical physics. The therapy developed in 1988 by Isaac Goiz Durán has particular conventions to establish the nomenclatures of the magnetic poles of the magnets. However, because it is a recent technique, with little consistency in literature and methodological rigor, the lack of standardization of nomenclatures may result in misunderstandings and incorrect applications of the technique, as well as lack of cohesion, coherence and homogeneity in the performance of therapists, which reflects negatively on the teaching, practice and future prospects of MB among schools that perpetuate the method.

To understand these disagreements, certain background information must be reviewed. This discussion will be divided into sessions involving the physical and historical principles that underlie the MB theory of the magnetic poles of therapeutic magnets and the biomagnetic poles of BMP. We will also discuss colors and illustrative representations for graphic materials, as well as present evidence from studies that demonstrate the mentioned inconsistencies.

As a theoretical foundation for understanding MB, the concept of magnetism is highlighted in this work. Magnetism, today, is an area of physics that is dedicated to the study of phenomena related to magnets, the magnetic field generated by them and the behavior of different materials subjected to the action of this field (CARBONELL et al., 2017). Historically, it is known that the interest of human beings in the phenomenon of magnetism dates back to the earliest civilizations. As a starting point, two events drew attention to the effect of magnetism and electromagnetism: the attraction of light bodies by rubbed amber and the ability of some small stones to attract iron (Fe), the so-called magnetites (CALÇADA; SAMPAIO, 2012; HEWITT, 2015; KNIGHT, 2009; MACHADO, 2002; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). Other civilizations have also observed the phenomenon and brought important contributions, such as the Egyptian, Chinese, and Roman civilizations, among others; highlighted here is the discovery of the compass by the Chinese, which was used for the purpose of magnetic orientation (CARBONELL et al., 2017; HEWITT, 2015; MACHADO, 2002; TIPLER; MOSCA, 2006).

Magnets have two magnetic poles, and these poles are usually located at the ends in the magnet, where the magnetic actions are intensified, being called north pole and south pole, or magnetic dipoles (DURAN, 2011; CALÇADA; SAMPAIO, 2012). Magnets still have the ability of magnetic attraction between different poles (the opposite poles) and magnetic repulsion between equal poles. For example, north pole is attracted by the south pole, while north pole is repelled by the north pole, and south pole is repelled by the south pole (CALÇADA; SAMPAIO, 2012; DAVIS, 1982; DURAN, 2011; HEWITT, 2015; YOUNG; FREEDMAN, 2015). Another characteristic described by classical physics is the alignment of the magnets' poles within the Earth's geographic poles where, the magnetic north pole of a magnet points to the geographic north pole (magnetic south of the planet), while the magnetic south pole of a magnet, points to the geographic south pole (magnetic north of planet Earth) (DURAN, 2011; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). The impossibility of separating the magnetic poles of a magnet (magnetic dipole), also consists of one of the properties, and by breaking a magnet in half, we have two magnets magnetic dipole (CALÇADA; SAMPAIO, 2012; HEWITT, 2015; YOUNG; FREEDMAN, 2015).

Maxwell in 1862, synthesized into four equations Ampère's law, Faraday's law of induction, and the Gaussian law combined with an addition by Maxwell's displacement current (DURAN, 2011; KNIGHT, 2009; YOUNG; FREEDMAN, 2015). He verified that magnetic and electric fields were related, finding that the variation of an electric field elevated to a magnetic field, just as it was capable of producing a dynamic electric field (DURAN, 2011). In this way, he concluded that together, these vectorial fields elevated the electromagnetic waves, such as visible light, radio waves, x-rays, among others (HEWITT, 2015). The discovery that electrical and magnetic phenomena are interrelated conceived the theory and area of knowledge of electromagnetism, which today is synthesized by the four Maxwell equations (DURAN, 2011; HEWITT, 2015; KNIGHT, 2009; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015).

It is currently known that the SMF are regions of space generated by magnets, and that magnetic fields are generated by movements of electric charges and electrons, and can exert influence on electric charges and magnetic materials, according to the magnetic properties of matter (DURAN, 2011; GRIFFITHS, 2011; HEWITT, 2015; PEREZ, 2022; PHILPOTT; KALITA; LOTHROP, 2000; YOUNG; FREEDMAN, 2015). In this sense, the concept of a magnetic pole resembles that of an electric charge, where the north pole and south pole may seem analogous to a positive and a negative charge, although in the case of magnetic poles, these are inseparable (magnetic dipoles) (HEWITT, 2015; YOUNG; FREEDMAN, 2015). Although there is no magnetic charge, this concept is commonly used because it allows the description of magnets in a convenient mathematical form (DURAN, 2011).

It is also worth mentioning that physics presents two directions for the electric current: the real and the conventional. The real direction indicates that the electrons (negative charge) move toward the highest electric potential (positive), while the conventional direction, defined in convention for arbitrary reasons, proposes the opposite (corresponds to the direction of the electric field inside the conductor, in the direction from the positive to the negative pole) (GRIFFITHS, 2011; HEWITT, 2015).

Still regarding the similarity of poles and charges, just like magnets, electric charges also have the property in which different signs attract and equal signs repel (DURAN, 2011; HEWITT, 2015; KNIGHT, 2009).

Magnetic fields provide two types of energy response: Davis and Raws (1993) state that the magnetic field considered positive (physics north pole/MB south pole) occurs when the electron spins clockwise, while the negative magnetic pole (physics south pole/MB north pole) the electron spin occurs counterclockwise.

The influence of these magnetic fields on our daily lives goes beyond electric motors, speakers, computers, microwaves, or refrigerator magnets (YOUNG; FREEDMAN, 2015). In addition to the magnetic field generated in the living organism itself, we are also enveloped by the Earth's magnetic field, known as the Earth's magnetosphere. The perception of the magnetic field occurred around the 15th century, when the English physicist William Gilbert (1600) verified that the compass always points to the earth's north, therefore concluding that the earth has magnetic polarities, that is, the earth behaves like a large magnet. Today we know that the magnetosphere serves as a protective shield against the sun's rays and is indispensable for the survival of the planet (DAVIS; RAWLS, 1996; GILBERT, 1600; MACHADO, 2002; YOUNG; FREEDMAN, 2015).

A magnet is a material consisting of ferromagnetic substances and causes a magnetic field around itself capable of magnetizing or attracting metallic materials or objects (GRIFFITHS, 2011; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). Ferromagnetic substances, such as iron, cobalt, and nickel, are strongly attracted to magnets (HEWITT, 2015; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). Paramagnetic substances such as magnesium, aluminum and platinum and diamagnetic substances such as copper, water, silver and gold are most often referred to as non-magnetic substances because their effects are very small when under the influence of a magnetic field (HALLIDAY; RESNICK; WALKER, 2007; DURAN, 2011; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). Considering that these elements, as well as many others are found in our body,

we can realize the importance of magnetism in our life, where the human body also produces magnetic fields, called biomagnetic (DURAN, 2011; YOUNG; FREEDMAN, 2015).

The magnetic field is mainly measured in the unit of measurement called Tesla (T), in honor of the scientist Nikola Tesla (DURAN, 2011; MACHADO, 2002; RAMALHO JUNIOR; FERRARO; SOARES, 2009). Although the International System of Units (SI) recognizes Tesla (T) as the main unit of measurement (INMETRO, 2012; LUIZ, 2009; YOUNG; FREEDMAN, 2015), in the old system of physical measurement units, CGS (Centimeter-Gram-Second), used by Isaac Goiz Durán (2008), the measurement unit for magnetic field is classified as Gauss (G) (DAVIS, 1982; LUIZ, 2009; MONTENEGRO; ELGUERA 2021; RAMALHO JUNIOR; FERRARO; SOARES, 2009). In this sense, it is chosen to describe in this work, both units when referring to the magnetic field, where 1 Millitesla (mT) corresponds to 10 Gauss (G) and 1 Tesla (T) = 10 000 G (DURAN, 2011).

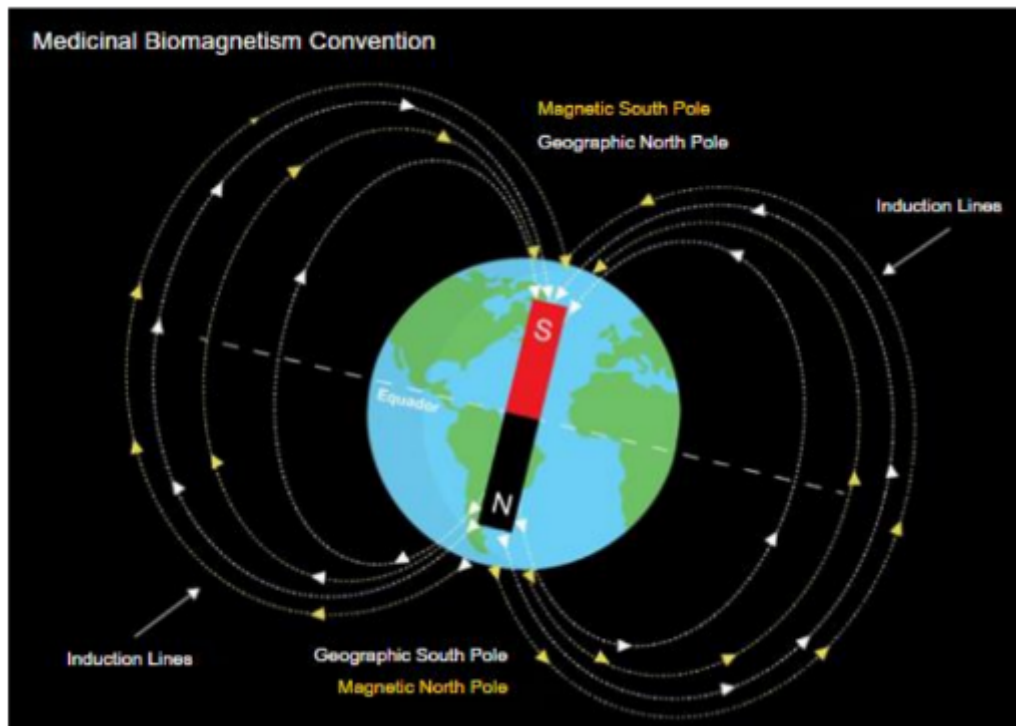
In addition, magnetic fields can be classified by their intensity, so that magnetic fields smaller than 1mT ($B < 1\text{mT}$) are considered “weak”; magnetic fields between 1mT and 1T ($1\text{mT} < B < 1\text{T}$) are considered “moderate”. And “intense” magnetic fields are those greater than 1T ($B > 1\text{T}$) (PEREZ, 2022; ZHANG; YAREMA; XU, 2017).

The magnetic field is vectorial, just like the electric field or the gravitational field, so it has the properties of modulus, direction and sense (CALÇADA; SAMPAIO, 2012). This type of field can be produced by natural magnets (when it comes from iron oxide, a mineral found in nature that receives the name magnetite) (CALÇADA; SAMPAIO, 2012) and artificial ones (when it is built with metal alloys or ceramic materials) that, when subjected to strong magnetic fields, acquire magnetic properties (HEWITT, 2015).

To understand the properties of the magnetic field, the resource known as induction lines is used, which allows you to better visualize the shape of the magnetic field (CALÇADA; SAMPAIO, 2012; HEWITT, 2015; TIPLER; MOSCA, 2006; YOUNG; FREEDMAN, 2015). The magnetic field lines are always closed and they never cross (DURAN, 2011). The closer they are, the greater the magnetic field

strength in that region. In addition, the region of the magnets from which induction lines emerge is called magnetic north and the region where these induction lines immerse is known as magnetic south (CALÇADA; SAMPAIO, 2012; HALLYDAY, 2007; RAMALHO JUNIOR; FERRARO; SOARES, 2009).

Figure 1: Representation of the Earth's Magnetic Poles, the Magnet, and Field Lines- Convention of Medicinal Biomagnetism (MB)



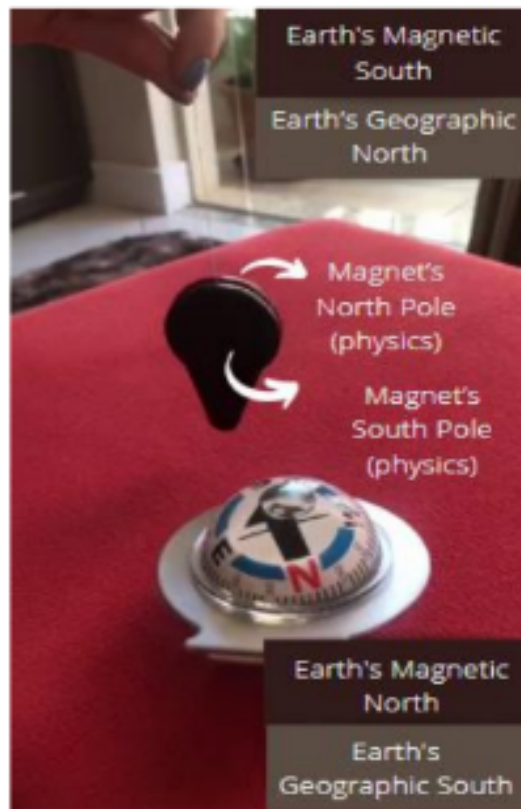
Legend: Representation of the Earth's magnetic poles and their field lines (yellow arrows). In the center of the image a MB magnet is represented as a hologram of the planet, following the same direction of the Earth's magnetic flux (white arrows), i.e., proposed MB convention. Source: Own authorship (2022).

The literature understands that the Earth's magnetic field is constituted due to the virtue of the movement of charges in its core, which makes it behave like a huge magnet (CALÇADA; SAMPAIO, 2012; HEWITT, 2015; YOUNG; FREEDMAN, 2015), where its magnetic poles correspond to the places on the Earth's surface where the magnetic induction lines depart (north) and converge (south) (MACHADO, 2002; RAMALHO JUNIOR; FERRARO; SOARES, 2009). The magnetic north pole is located near the geographic south pole and the magnetic south pole is located near the geographic north pole (DURÁN, 2011; HEWITT, 2015). In

this sense, it can be said that there is an inversion between the magnetic and geographical poles, although this is not static and changes slowly over time (DURAN, 2011; HEWITT, 2015).

For historical and arbitrary reasons, the northern and southern hemispheres were for that reason titled, without direct relation to the Earth's magnetic field (CALÇADA; SAMPAIO, 2012). This denomination is attributed by the property of attraction and repulsion of magnets (equal charges attract and different ones repel) observed in the compass. This instrument contains a magnetized needle, in which its tip (north) always points to the geographic north, that is, the magnetic south of the planet earth. Therefore, according to classical physics, when a magnet is freely supported, the face that points to the geographic north is identified as the north pole of the magnet (CALÇADA; SAMPAIO, 2012; HEWITT, 2015; RAMALHO JUNIOR; FERRARO; SOARES, 2009; YOUNG; FREEDMAN, 2015). The magnet, in this case, represents the tip of the compass arrow, which indicates the geographic north of the planet Earth, that is, the magnetic south. It is understood that the opposite side of the magnet, which points to the geographic south (magnetic north), is the south pole of the magnet (HALLYDAY, et al., 2007).

Figure 2: Identifying the Magnetic Poles Convention of Physics from a MB Magnet



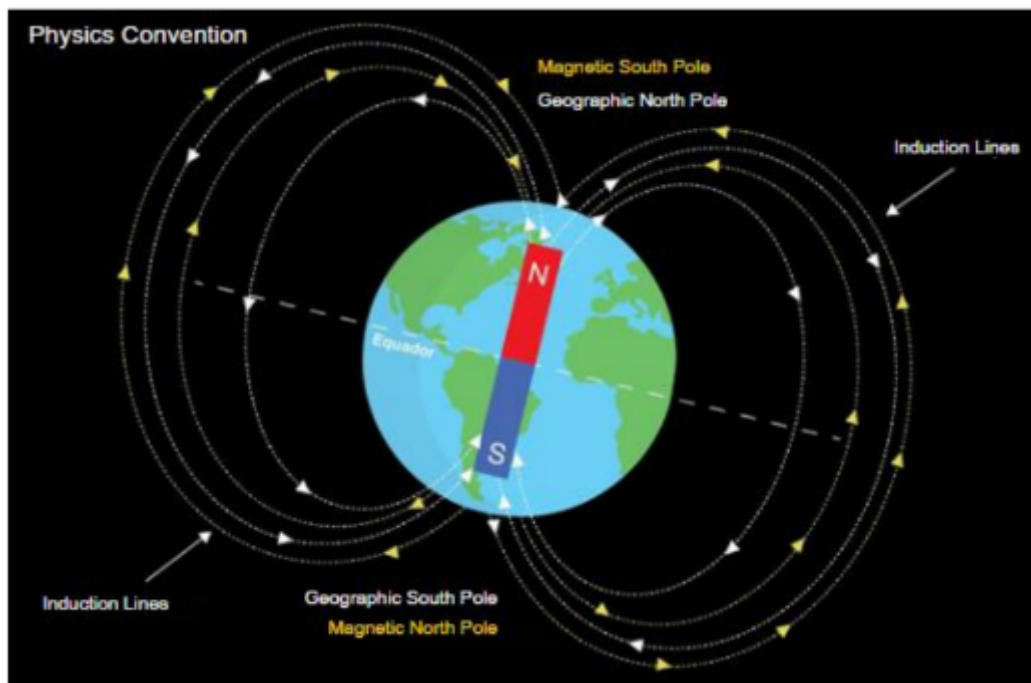
Legend: The magnet MB when suspended by its center so that it can move freely will present its red face to the Earth's geographic north / magnetic south. In this sense, the red face of the MB magnet corresponds to the north pole of the magnet for physics, because like the compass, the tip of its arrow (north pole) will always indicate the Earth's geographic north / Earth's magnetic south. The black face of the MB magnet, on the other hand, represents the south pole of the magnet for physics, as it points to the Earth's geographic south/magnetic north.

Source: Own authorship (2022).

In summary, it is observed that classical physics starts from the perspective of a magnet as a compass, which makes sense when remembering the functions of orientation that were used throughout history in the period of great navigations. In addition, later, with the important discovery of electromagnetism, it was used for electronic purposes, where the direction of the electric current, despite already knowing the real one (negative to positive), was still chosen to keep the conventional one (positive towards negative). For calculation purposes and in physical practice, this inversion between the magnetic and geographical poles and difference in the direction of the electric current (real and conventional), is not significant, but for the application of magnetic fields in living beings yes,

especially in the MB technique, where the impact of each pole results in different effects.

Figure 3: Representation of the Earth's Magnetic Poles, the Magnet, and Field Lines – Physics Convention



Legend: Representation of the Earth's magnetic poles and their field lines (yellow arrows). In the center of the image a classical physics magnet represents the function of the compass, indicating the geographic north of the planet Earth, that is, the magnetic south (white arrows), and opposing, therefore, the direction of the Earth's field. Source: Own authorship (2022).

The theory of SMF generated by the therapeutic magnets used in the MB technique obeys the convention of holographic alignment of the magnetic poles among planet Earth, the magnet, and the human body (DAVIS, 1982; GOIZ DURÁN, 2008; MARTÍNEZ, 2018), according to Figure 1. The physics, according to Figure 2, obeys the geographical convention (CALÇADA; SAMPAIO, 2012).

For MB, when suspending their magnets, pole alignment occurs if a magnet is positioned in a way where it can move freely, the orientation of the magnet occurs with its south pole face directed toward the Earth's geographic north (magnetic south) and the magnet's north face directed toward the Earth's

geographic south (magnetic north) (DAVIS, 1982; GOIZ DURÁN, 2008; MARTÍNEZ, 2018).

Figure 4: Identification of the MB Magnetic Poles Convention from a MB Magnet



Legend: The magnet MB when suspended by its center so that it can move freely will show its red face towards the Earth's geographical north / Earth's magnetic south. In this sense, the red face of the MB magnet corresponds to the south pole of the MB magnet, as it represents a hologram of the planet Earth, i.e., it follows the same flow of the Earth's magnetic fields. The black face of the MB magnet, on the other hand, represents the north pole of the MB magnet, as it points to the Earth's geographic south/magnetic north. Source: Own authorship (2022).

Another way to identify the magnetic poles of the MB therapeutic magnets is to use a compass. The arrowhead of the compass (north) indicates the geographic north of the planet Earth (magnetic south). When approaching the north pole of a MB magnet (south pole for physics) to the compass, the tip of the arrow will indicate its face as the north pole of the MB magnet, conventionally black,

negative. If the south, red, positive face of that same magnet is approached, the tip of the arrow rotates 180°, letting the “nock” of the arrow indicate the south pole of the magnet (GOIZ DURÁN, 2008; MARTÍNEZ, 2018).

Figure 5: Relation of the Poles of the MB Magnets to the Earth Magnetic Poles



Legend: The first image on the left shows that the tip of the compass needle (north pole of the magnetic needle) points to the magnetic north pole (black/negative) of the MB magnet. The second image shows that the “nock” of the arrow points to the south pole (red/positive) of the MB magnet. Source: Bossa (2021c).

Regarding colors, the magnets used by Isaac Goiz Durán (2008) were covered with black leather (north pole of the MB/south for physics) and red (south pole of the MB/north for physics). As for classical physics, it is possible to observe that usually, magnets are represented with the colors red for the north pole and blue for the south pole (CALÇADA; SAMPAIO, 2012; DURAN, 2011; RAMALHO JUNIOR; FERRARO; SOARES, 2009).

To understand the convention proposed for MB, it is also necessary to consider the knowledge of TCM, considering the background of Isaac Goiz Durán and the importance of this knowledge for the development of the technique (GOIZ DURÁN, 2008).

The dualistic concept of the Yin-Yang theory becomes important to support why it was first observed in ancient China, that the basic structure of the human being was the same as the Universe, where everything that exists consists of two

essential aspects that are complementary and maintain a dynamic balance between them (WEN, 2006). These phenomena of nature were classified into two poles: Yin (negative polarity), represented by more introspective phenomena or with a lower degree of activity, such as cold, rest, darkness, retraction; and Yang (positive polarity) involving aspects that consist of greater activity, such as heat, clarity, expansion, strength, etc.

(WEN, 2006; GOIZ DURÁN, 2008, 2014; PHILPOTT; KALITA; LOTHROP, 2000; YAMAMURA, 2004).

In this primitive sense, we find the idea of polarity, which can be observed throughout nature (WEN, 2006). We can compare the Yin-Yang with the poles of a magnet, where there is no inseparability of poles or final possibility of one of the two sides overcoming the other this way; opposite sides coexist, but represent the same unity (PÉREZ, 2010). Furthermore, through the Yin-Yang interaction derive the theory of the Five Movements, where the energy circulation will follow the order from one to another, that is, from a Yin to a complementary Yang that will follow the movement, fulfilling the principles of energy alternation (PÉREZ, 2010).

In this line of thought, the duality found in Yin-Yang can be related to the north and south poles of a magnet, to negative and positive electrical charges, centrifugal forces of expansion (electrons) and a centripetal force of cohesion (neutrons and protons), acid-base balance (alkalinity [OH⁻] and acidity [H⁺]), and to our body's physiology, in complementary antagonistic systems as parasympathetic nervous system (Yin) and sympathetic (Yang), regulation of Sodium and Potassium in the central nervous system (Yin as a state of rest and relative inertia / Yang as energy production) and so on (PÉREZ, 2010).

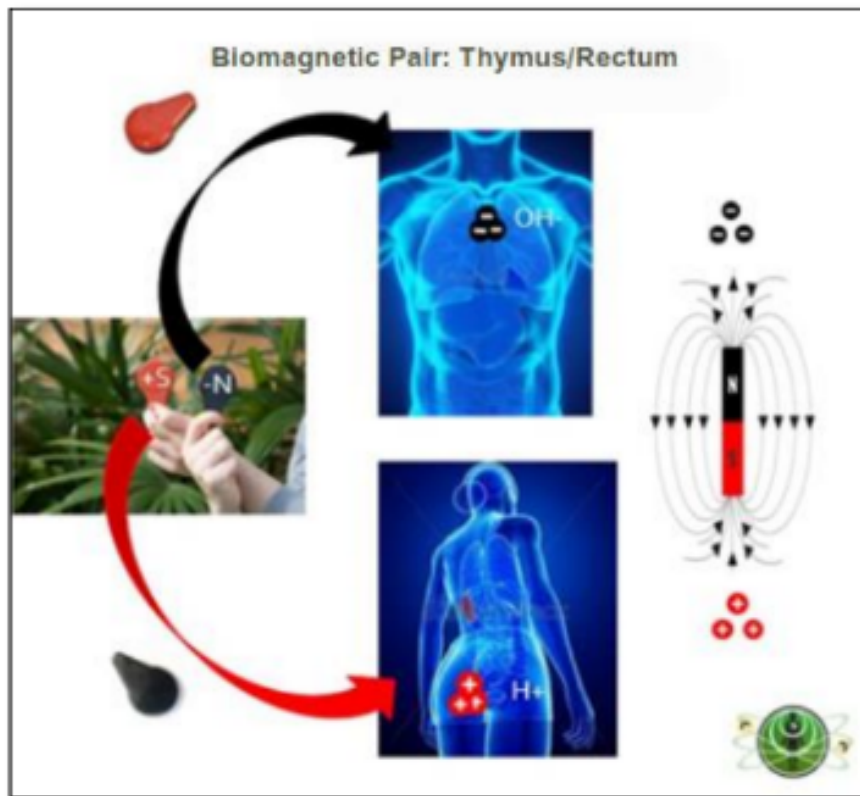
Consequently, we can see that much of what we have of current scientific content, derives from simple language of ancient texts from simple observations, starting from common sense (PÉREZ, 2010; YAMAMURA, 2004).

This concept of duality is applied in the MB technique, where to resume the balance of the BMP identified in the scanning, depolarization is performed with a

pair of magnets (north and south pole). For the formation of a BMP, both charges of the different biomagnetic poles (alkalosis/acidosis) need to be in resonance with each other (GOIZ DURÁN, 2003; DE CASTEJÓN, 2015; DE MONDELO, 2016-2017). The north polarity of a BMP is formed from the accumulation of negative ions, such as OH, or other free radicals, developing a biological ground that is more alkaline than physiological (hyperoxia-alkaline: alkalinity and high oxygen). The south polarity of a BMP, in contrast, is formed from the excess of positively charged hydrogen ions (H⁺), which results in a biological terrain that is more acidic in character than the physiological one (acid-hypoxia: acidity and low oxygen) (DAVIS; RAWES, 1993). This BMP formation occurs from the opposite spiral rotation of electrons in the negative and positive fields (PHILPOTT; KALITA; LOTHROP, 2000).

The north pole of one magnet of MB (south for physics) is then applied to the north polarity of BMP in the body (region of alkalosis) and the south pole of another magnet (north for physics), to the south polarity of BMP (region of acidosis). After the impaction of the magnets, following explanation above, the treatment of BMP occurs through the property of attraction and repulsion, where the excessive charges that hold these pairs are pushed/repelled from the initial anatomical point against each other. Upon meeting, these ion-charged charges collide and a neutralization reaction occurs. According to Arrhenius theory, it is equivalent to mixing the acid with the base, restoring the ideal pH of the impacted region (MASA et al., 2019).

Figure 6: Impact of BMP: Thymus/Rectum



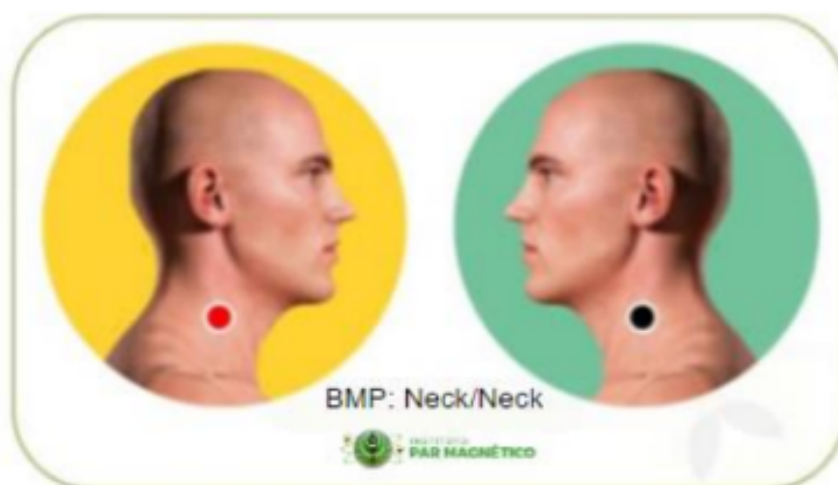
Legend: The upper part of the image, where OH^- is shown, represents an accumulation of this free radical in the TIMO region, indicating a state of local alkalosis (North Pole of the BMP). The lower part of the image, where H^+ appears, represents an accumulation of hydrogen ion in the RETO region, where a state of local acidosis is identified (South Pole of the BMP). The figure also shows the magnetic pole convention of the MB magnet, where the black face of the MB magnet represents the North (negative) pole of the magnet, which should be applied in the region of alkalosis, in this case, the thymus. The red face of the MB magnet represents its South (positive) pole, which should be applied in the region of acidosis, in this case, the Rectum. These two regions when they are in resonance are called a “Biomagnetic Pair” (BMP), in this case “Thymus/Rectum Pair”. The name of the BMP is described by the point/anatomical region where there is a state of alkalosis and subsequently by the anatomical region where there is acidosis. Source: Bossa (2021c).

Regarding the colors used to represent magnetic poles, it can be observed that just as there are no clear explanations in classical physics about the blue and red color convention for magnets, there is also no description of the specific reasons why this color convention was established in the MB (red and black). However, colors serve an important function in identification and symbolism, which,

according to Heller (2013), saves time and effort when they are used in a well-targeted manner. In this sense, differentiating therapeutic magnets through colors facilitates the didactic aspect of the technique, the understanding of the purpose of using each pole, differentiation of the contexts used, and standardization regarding the use of magnetic poles in future academic research on MB, as well as for clinical practice.

In addition, it is important to have a clear convention for graphic materials and illustrative representations of the impacted magnets (CEBALLOS et al., 2014). It is proposed that the representations respect the perception of the external observer, so that if the image shows the color red (south pole of the MB/north pole of physics), the skin should be impacted with the color black (north pole of the MB/south pole of physics), while if the image shows the color black (north pole of the MB/south pole of physics), the skin will be red (south pole of the MB/north pole of physics), as shown in Figure 7.

Figure 7: Graphical Material with Illustrative Representation of the Impacted Magnets According to Isaac Goiz Durán's Method



Legend: The figure illustrates the impact of the BMP: Neck/Neck. The perception must be of an external observer, so if the image shows the color red (south pole of the MB/north pole of physics), the skin should be impacted with the color black (north pole of the MB/south pole of physics), while, if the image shows the color black (north pole of the MB/south pole of physics), the skin will be red (south pole of the MB/north pole of physics). Source: Bossa (2021c).

The divergence in illustrations and in the description of the use of magnetic poles and BMP for MB reflects negatively on teaching and practice among schools that perpetuate the method. We can verify as an example, the BMP guide developed by David Goiz Martínez (2017), where images that specify the positioning within the anatomical-topographical reference system of the human body were used with the colors usually of classical physics: blue and red. However, the blue color in this guide (commonly south for physics), is representing the north pole in the BMP and the red (commonly north for physics), representing the south. Therefore, disturbances and misunderstandings could and can be avoided by having a clear particular convention for the MB, respecting the assumptions of Isaac Goiz Durán, by using the colors black (north) and red (south) only (DE MONDELO, 2017).

The first author to describe in a scientific article the BMP theory, according to Isaac Goiz Durán's method of using the magnetic poles, was a study that showed effective results in the treatment of typhoid fever, in most of its samples (FRANK, 2017). The study conducted by Frank (2017) presents the black magnet as negative, with a Scanning Magnet Function and will be applied on the first structure of the BMP which is the region corresponding to the shortening of the right hemibody. The red magnet, on the other hand, is classified as positive and will be impacted on the paired structure that results in the alignment of the lower limb length. It is important to point out that at no moment the article refers to the north and south poles, or explicitly states that the region where the shortening is identified is where there is alkalosis, and that the region where the BMP is paired is where there is acidosis. The lack of specific description of these aspects, may hinder the understanding of researchers unfamiliar with the technique, after all, for classical physics, magnets have no electrical charge and are usually painted blue (south) and red (north) (DURAN, 2011).

Another study demonstrates the evolution of glucose in geriatric diabetic patients with the application of MB (JIMENO UCLES; PEÑA AMARO; BAENA DOMINGO, 2014). Although it does not present statistical significance, it shows in most cases that glucose levels were reduced with the application of the technique in 64.28% of the sample. The methodology of the study, however, does

not describe how the SMF were applied, it only states that their magnitude was greater than 1000 Gauss. This gap makes it impossible to reproduce and verify these results, fundamental characteristics in science (FREITAS, 2017).

Rodríguez (2013), in his thesis on applied medical therapy with magnets for health, describes both magnet therapy and MB. Although he does not mention Isaac Goiz Durán, it is possible to observe that he uses his method for applying the magnetic poles of magnets (north/negative/black pole and south/positive/red pole).

We can also verify that theses at the undergraduate level, also occupy themselves with the study of the MB. An ethnographic research describes the use of magnetic poles for the MB when studying the experience of users of the technique (AGUILEF; HUIQUIMILLA, 2009), concluding that it is a good therapeutic option with mostly positive results for users. Cárdenas, Collinao, and Mera (2013) also investigated the perception of users treated with MB as a therapy for the relief of chronic pain. Although, they present positive results, when describing the application of the SMF, they refer only to the negative pole of the magnet applied on the excess of negative charges of the BMP and the positive pole of the magnet on the excess of positive charges of the BMP, which also does not make it clear, which is the north pole and which is the south pole (CÁRDENAS; COLLINAO; MERA, 2013).

Still on divergences found in the literature, an important thesis by Enrique de Juan González de Castejón presents the biological effects of BMP therapy using the magnets and measuring the effects they have on neuromuscular excitability, the so-called Magnet-sympathetic-foot reflex (MSFR) (DE CASTÉJON, 2015). Despite its scientific relevance for MB, it generated doubts among therapists who practice the technique, when describing that the impaction of a 0.1 T magnet, in an area of the body acidic, generates a shortening of the right leg. These doubts arose from the lack of description of the magnetic pole used to generate this response, so that different poles generate different responses of shortening or lengthening (GOIZ DURÁN, 2005a, 2005b, 2008).

Montenegro and Elguera (2021) also present relevant results: they demonstrate a significant variation in salivary pH after application of the MB in patients in a stomatology clinic. However, in this study, the north pole is red and has a positive charge and the south pole is black and has a negative charge; that is, it is contrary to the method used by Isaac Goiz Durán (north/black/negative and south/red/positive).

Although there are divergences regarding the use of poles for the magnets, it is possible to observe that the studies already show some results that may be promising to new researchers. However, because it is still a hypothesis, it lacks scientific robustness and can often be interpreted as pseudoscience or even charlatanism (MIREs REYES, 2021). Furthermore, the absence of clear conventions and councils that regulate the practice, allows the exercise of therapists unprepared for the performance, as well as, passing on information often in a wrong way, which contributes to a negative view of the technique. This scenario provides room for undue labeling and generalizations. Among the critics of the practice, Mires-Reyes (2021) presents a review trying to present evidence to demonstrate that the MB practice does not work as a health treatment, proposing the rejection of its use. Although the evidence presented is relevant, the suggestion to disregard this knowledge can be interpreted as hasty, after all, in the same way that the path of evidence of efficacy backed by science is arduous, the proof of ineffectiveness also takes the same path, so that the evidence presented is far from sufficient to challenge knowledge, which although initially was common sense, has the potential for great branch in research (DAMYANOV; MASLEV; PAVLOV; TODOROV, 2019a, 2019b; LUNA-TRILLO; ESPINOSA-PÉREZ, 2016). In this sense, rejecting its use can mean retrogression and neglect of beneficial effects that this knowledge can produce.

This study is important, therefore, because it is through standardization that new research can be guided to study the technique in a reliable and reproducible way, in method and results (MARKOV, 2007). The main difference between the conventions presented concerns the magnetic poles (north and south), as well as the flow direction. As a consequence, MB takes into account the TCM fundamentals, where we start from Yin to Yang; the actual direction of the

electric current (negative to positive) and the direction of the magnetic field flow (from north to south), summarizing that the MB point of view is the magnet as a hologram of the earth, which follows the flow of the body itself, when impacted. Classical physics, on the other hand, approaches the perspective of the magnet as a compass, where the tip of the magnetized needle (north) is attracted by the magnetic south pole (geographical north).

Therefore, it is suggested to establish a convention for the use of magnetic poles for MB, where the north pole (negative for the MB) is represented by the color black, and the south pole (positive for the MB) is represented by the color red. It is proposed that the convention established by the creator of the MB technique himself be maintained (the north pole of the MB magnet is the one that points to the geographical south and the south pole is the one that points to the geographical north) and that through this work, therapists and researchers can be guided to understand the use of magnetic poles for this technique.

It is proposed that the terms “MB north pole” (referring to the magnetic south pole of physics) and “MB south pole” (referring to the magnetic north pole of physics) be used in articles, texts, and MB practices.

The colors, although relevant in symbols and meaning, are not the main reason for establishing a convention for using magnetic poles for MB. The assigned denomination is important, but it does not directly influence the outcome of the treatment, as long as the therapist knows its objective and it has a clear intention when impacting each pole in its respective location. However, the colors serve as a representation tool for therapy and as a way of identifying the north and south poles for the MB technique. Furthermore, this convention helps to ensure that the foundations and fundamentals of TCM, so dear to MB, are not lost. In summary, there is no right or wrong convention, the same phenomenon can be observed and understood from several perspectives, the main question is: which is preferable to adopt and why.

It is worth emphasizing that the MB technique is a complementary and integrative therapy, that is, it should not replace any treatment, or be interpreted

as a “cure” for disease. The information provided by a therapist should not be considered as a diagnosis, definitive treatment or prescription, so that the diagnosis made refers to the BMP found through subjective scanning and not as a conclusive diagnosis like conventional medicine. So, those seeking treatment for a specific disease should consult their physician to determine the appropriate, correct and accepted treatment protocol before using any other complementary method.

4. FINAL CONSIDERATIONS AND FUTURE PERSPECTIVES

We suggest the use of the convention established by Isaac Goiz Durán, creator of the technique, where it is defined that the north pole of the MB magnet (north pole MB) is the one pointing to the geographical south and the south pole of the MB magnet (south pole MB) is the one pointing to the geographical north. The north pole MB of the magnet is called negative and the south pole MB, positive. The north pole

MB of the magnet is applied to the accumulation of negative charges (north pole of the BMP), while the south pole MB of the magnet, to the accumulation of positive charges (south pole of the BMP). In this way, standardization of future academic research and clinical practice is agreed upon.

This convention is established to use the nomenclature and systematization of the magnetic poles generated by magnets and in the BMP within the application in MB. This article, besides being original, is of utmost importance for all biomagnetism therapists and other researchers who aim to study the technique in a reliable manner. We suggest that this standardization be used in future research within the MB area so that this convention can be reproducible in methods and results, fundamental characteristics for quality scientific research and proof of effectiveness of the system that was studied, applied and tested.

REFERÊNCIAS

AGUILEF, C. HUAQUIMILLA, G. **Estudio etnográfico: vivência de usuários de terapia de biomagnetismo.** Tese (Graduação) – Licenciatura em enfermagem,

Universidad Austral de Chile, Facultad de Medicina, Instituto de Enfermería, Chile, 2009.

ARAUJO, D. B. de; CARNEIRO, A. A. O; BAFFA, O. Localizando a atividade cerebral via magnetoencefalografia. **Cienc. Cult.**, São Paulo, v. 56, n. 1, p. 38-40, jan. 2004. Disponível em: http://cienciaecultura.bvs.br/scielo.php?script=sci_arttext&pid=S000967252004000100026&lng=en&nrm=iso. Acesso em: 01 nov. 2022.

BOSSA, A. V. **Protocolo de rastreio do Biomagnetismo Medicinal**. Cascavel/PR: Editora Independente; Volume 1, Ed. 12. Agosto – 2021a. Disponível em www.institutoparmagnetico.com.br. Acesso em: 11 out. 2022.

BOSSA, A. V. **Introdução e fundamentos de Biomagnetismo Medicinal**. [Apresentação do Power Point]. 20 fev. 2021b. Disponível em: <https://institutoparmagnetico.com.br/>. Acesso em: 02 nov. 2022.

BOSSA, A. V. **Apostila de Biomagnetismo Medicinal**. Cascavel/PR: Editora Independente; Volume 1, Ed. 12. Agosto – 2021c. Disponível em www.institutoparmagnetico.com.br. Acesso em: 11 out. 2022.

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. **Política nacional de práticas integrativas e complementares no SUS: atitude de ampliação de acesso**. – 2. ed. – Brasília: Ministério da Saúde, 2015. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/politica_nacional_praticas_integrativas_complementares_2ed.pdf. Acesso em: 31 out. 2022.

BROERINGMEYER, Richard. **Princípios de la terapia magnética**, 1991.

CALÇADA, C. S; SAMPAIO, J. L. **Física clássica 3: eletricidade e física moderna**. São Paulo: Atual, 2012.

CALEGARI, J. **Representação dos pólos magnéticos da Terra, do imã e linhas de campo**. Joinville, SC, 2022. Ilustração.

CARBONELL, M. V.; FLÓREZ, M.; MARTÍNEZ, E.; ÁLVAREZ, J. Aportaciones sobre el campo magnético: historia e influencia en sistemas biológicos. **Intropica**, [S. l.], v. 12, n. 2, 2017. DOI: 10.21676/23897864.2282. Disponível em: <https://revistas.unimagdalena.edu.co/index.php/intropica/article/view/2282>. Acesso em: 27 oct. 2022.

CÁRDENAS, C.; COLLINAO, Y. MERA, M. J. **Percepción de usuarios tratados con Biomagnetismo como terapia para el alivio del dolor crónico en la Ciudad de Valdivia**. Tese (Graduação) – Licenciatura em enfermagem, Universidad Austral de Chile, Facultad de Medicina, Instituto de Enfermería, Chile, 2009.

CEBALLOS, A; CASANDRA, M; JIMENEZ, M; LIMA, F.A.C; ERICK. **La infografía como recurso didáctico para la capacitación de la terapia de biomagnetismo médico**. Tese (Graduação) – Licenciatura, Benemérita Universidad Autónoma de Puebla, México, 2014. Disponível em: <https://repositorioinstitucional.buap.mx/handle/20.500.12371/5241> Acesso em 06 out. 2022.

DAMYANOV, C.; MASLEV, I; PAVLOV, V; TODOROV, A. A new treatment method of Advanced Metastatic Tumors. **Annals of Clinical Case Reports**. v. 4, n. 1647, p. 1-6, 2019a.

DAMYANOV, C.; MASLEV, I; PAVLOV, V; TODOROV, A. Integrative oncology at the clinician's look chronology for the creation and development of the IPT & BMP Method for treatment of oncological diseases. **Clinics in Oncology**. v. 4, n. 1671, p. 1-5, 2019b.

DAVIS, A. R. **The Anatomy of Biomagnetism**. (S.l.): Vantage Pr, 1982.

DAVIS, A. R.; RAWLS JUNIOR, W. C. **The Magnetic Blueprint of Life**. Kansas city, Missouri: Acres USA, 1993.

DAVIS, A. R.; RAWLS JUNIOR, W. C. **Magnetism and Its Effects on the Living System**. New York: Acres USA, 1996.

DE CASTEJÓN, E. de J. G. **Efeitos Biológicos do Par Biomagnético sobre la Excitabilidad Neuromuscular.** Tese (Doutorado) – Programa De Doutorado em Medicina, Universidade de Alcalá, Alcalá de Henares, 2015.

DE MONDELO, S. G. R. **El par biomagnético del Dr. Isaac Goiz Durán.** Sevilla, Espanha: 2. ed, Salud y Bioestética, 2016-2017. Disponível em: <https://docer.com.ar/doc/sen8s5n>. Acesso em: 01 nov. 2022.

DE MONDELO, S. G. R. **Atlas del par biomagnético del Dr. Isaac Goiz Durán.** 2. ed. Baleares: Salud y Bioestética, 2017.

DURAN, J.E.R. **Biofísica: conceitos e aplicações.** 2. ed. – São Paulo: Pearson Prentice Hall, 2011.

FRANK, B. L. Biomagnetic Pair Therapy and typhoid fever: a pilot study. **Medical Acupuncture**, [S.l.], v. 29, n. 5, p. 308-312, 2017. Mary Ann Liebert Inc. <http://dx.doi.org/10.1089/acu.2017.1253>. Acesso em: 03 out. 2022.

FREITAS, D. R. **Metodologia Científica:** Um guia prático para profissionais da saúde. Petrolina, PE, 2017.

GILBERT, William. **De magnete.** Londres: Peter Short, 1600.

GOIZ DURÁN, I. **El Fenomeno Tumoral.** Universidad Nacional de Loja, 2003.

GOIZ DURÁN, I; CASTELÁN, Guillermo Mendoza; CASTELÁN, Pedro Mendoza. **Par Biomagnético, Biomagnetismo Médico y Bioenergética, experiências de curación**, tomo I. Chapingo, México D. F.: Universidad Autónoma Chapingo, 2005a.

GOIZ DURÁN, I; CASTELÁN, Guillermo Mendoza; CASTELÁN, Pedro Mendoza. **Par Biomagnético, Biomagnetismo Médico y Bioenergética, experiências de curación**, tomo II. Chapingo, México D. F.: Universidad Autónoma Chapingo, 2005b.

GOIZ DURÁN, I. **O Par Biomagnético**. Tradução de Dr. Mario Salinas Soto; Lic. Isaac Salinas Soto; Lic. Michelle Genesisio. 5. ed. Chapingo, México D. F.: Universidad Autónoma Chapingo, 2008. El par Biomagnético.

GOIZ DURÁN, I. **Fisiopatología bioenergética**. México City, México Medicinas Alternativas y Rehabilitación S. A. de CV, 2014.

GRIFFITHS, D. J. **Eletrodinâmica**. 3. ed. São Paulo: Pearson Addison Wesley, 2011.

HALLIDAY, D.; RESNICK, R.; WALKER, J. **Fundamentos de física: eletromagnetismo**. 7. ed. Rio de Janeiro: LTC, 2007. v.3.

HELLER, E. **A psicologia das cores: como as cores afetam a emoção e a razão**. São Paulo: Gustavo Gili, 2013.

HEWITT, P. G. **Física conceitual**. 12. ed. Porto Alegre: Bookman, 2015

INMETRO. **Sistema Internacional de Unidades (SI)**. 8. ed. Rio de Janeiro, 2012.

JIMENO UCLES, R.; PEÑA AMARO, M. DEL P.; BAENA DOMINGO, M. Evolución de la glucosa en pacientes geriátricos diabéticos con la aplicación del par biomagnético. **Gerokomos**, v. 25, n. 3, p. 107–110, set. 2014.

KNIGHT, R. D. **Física 3: uma abordagem estratégica**. 2. ed. Porto Alegre: Bookman, 2009.

KRUEGER BECK, E. K.; SCHEEREN, E. E.; NOGUEIRA NETO, G. N.; NOHAMA, P. Campos elétricos e magnéticos aplicados à regeneração nervosa periférica. **Revista Neurociências**, [S. l.], v. 19, n. 2, p. 314–328, 31 mar. 2011. DOI:10.4181/RNC.2010.ip04.13p.

LUIZ, A. M. **Física 3: eletromagnetismo: teoria e problemas resolvidos**. São Paulo: Livraria da Física, 2009.

LUNA-TRILLO, V.; ESPINOSA-PÉREZ, J. Estudio cuantitativo de imanes permanentes y su campo magnético usados en terapias de biomagnetismo en México. **Muuch' Xímbal Caminemos Juntos**, v. 2, p. 215–242, 4 fev. 2016.

MACHADO, K. D. **Teoria do eletromagnetismo**. Ponta Grossa: UEPG, 2002. v. 2.

MARKOV, M. S. Therapeutic application of static magnetic fields. **The Environmentalist**, v. 27, n. 4, p. 457–463, 1 dez. 2007.

MARTÍNEZ, D. G. **Guía de pares biomagnéticos**. Ciudad de México: Biomagnetism Research Institute, 2017.

MARTÍNEZ, D. G. **Manual del biomagnetista**. Ciudad de México: Biomagnetism Research Institute, p. 6., 2018.

MASA, J.; BARWE, S.; ANDRONESCU, C.; SCHUHMANN, W. On the Theory of Electrolytic Dissociation, the Greenhouse Effect, and Activation Energy in (Electro)Catalysis: A Tribute to Svante Augustus Arrhenius. **Chemistry– A European Journal**, v. 25, n. 1, p. 158–166, 2 jan. 2019.

MIRES-REYES, A. Biomagnetismo en la actualidad: ¿Realmente es una terapia curativa? **Revista Humanista**, p. 42–46, dez. 2021.

MONTENEGRO, M. R. Z.; ELGUERA, G. L. **Aplicación de pares biomagneticos en pacientes de la clinica estomatologica “luis vallejos santoni” y su variacion de ph salival, cusco 2019**. Tese (Especialização) para obtenção de título profissional de cirurgião dentista. Facultad de Ciencias de la Salud e Escuela Profesional de Estomatología. Universidade Andina Del Cusco, 2021.

ORGANIZAÇÃO PAN-AMERICANA DA SAÚDE (PAHO). **Medicinas tradicionais, complementares e integrativas**. Disponível em: <https://www.paho.org/pt/topicos/medicinas-tradicionais-complementares-e-integrativas>. Acesso em: 02 nov. 2022.

PÉREZ, A. C. N. **Acupuntura I: fundamentos de bioenergética**. Madrid: Cemetc S.L., 2010.

PEREZ, Í. P. D' A. **O efeito da Exposição de Campos Magnéticos Estáticos sobre Fibroblastos em Cultura**. Tese (Mestrado) – Programa de Pós-graduação Multidisciplinar em Física Aplicada, Universidade Federal do Rio de Janeiro. Rio de Janeiro, 2022.

PHILPOTT, W. H.; KALITA, D. K.; LOTHROP, L. **Magnet Therapy: A Natural Solutions Definitive Guide**. (S./.): Celestial, 2000.

RAMALHO JUNIOR, F.; FERRARO, N. G.; SOARES, P.A. de T. **Física 3: os fundamentos da física**. 10. ed. São Paulo: Moderna, 2009.

RODRÍGUEZ, M. A. G. **Terapia Médica Aplicada Con Imanes para la Salud**. Tese (especialização) – Medicina Naturopática, Atlantic International University: Quito, Ecuador, 2013.

TIPLER, P. A.; MOSCA, G. **Física: para cientistas e engenheiros**. Rio de Janeiro: Gen/ LTC. 2006. v. 2: Eletricidade e magnetismo, ótica.

WEN, T. S. **Acupuntura clássica chinesa**. São Paulo: Cultrix, 2006.

YAMAMURA, Y. **Acupuntura tradicional: A arte de inserir**. 2. ed. São Paulo: Roca, 2004.

YOUNG, H. D.; FREEDMAN, R. A.; **SEARS-ZEMANSKY Física III: Eletromagnetismo**. 14. ed. São Paulo: Pearson Education do Brasil, 2015.

ZHANG, X.; YAREMA, K.; XU, A. **Biological Effects of Static Magnetic Fields**. Singapore: Springer Nature, 2017.

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